

Bifunctional Membrane for High Energy, Long Shelf Life Li-S Batteries, Phase I

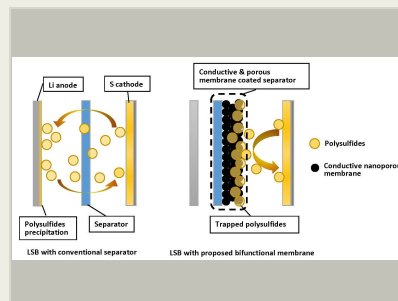
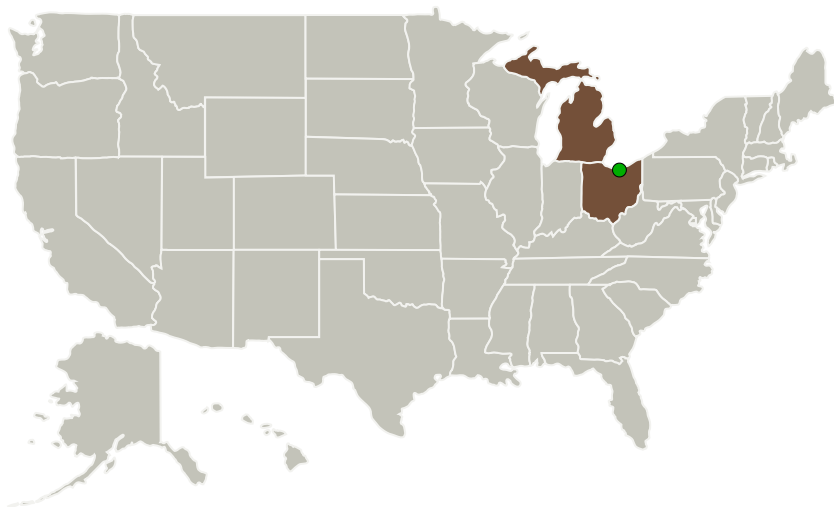
Completed Technology Project (2017 - 2017)



Project Introduction

The adoption of high energy lithium sulfur batteries hinges on significant improvements in charge/recharge cycle life. Cycle life is limited by migration of dissolved polysulfide species which creates an electrochemical short circuit. In this NASA SBIR, Navitas Systems will demonstrate and scale up a bifunctional membrane separator that impedes polysulfide transport. Bifunctionality will combine pore structure engineered for high capacity and selectivity to polysulfides with metal-like electronic conductivity to support electrochemical regeneration. The proposed membranes will be fabricated using slurry cast methods that readily scale to continuous roll-to-roll production. The slurry will combine a nanoporous conductive ceramic powder with a binder and solvent. Slurries will be castable onto conventional porous polyolefin battery separators. In Phase I, membrane separators will be produced at bench scale and evaluated to assure good adhesion and uniform dispersion at the target weight loading, with minimal added impedance to lithium ion transport. Membrane separators will be incorporated into prototype lithium sulfur batteries and subjected to commercially relevant performance and life testing.

Primary U.S. Work Locations and Key Partners



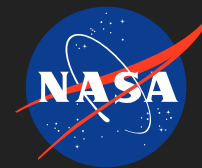
Bifunctional Membrane for High Energy, Long Shelf Life Li-S Batteries, Phase I Briefing Chart Image

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Organizations Performing Work	Role	Type	Location
Navitas Advanced Solutions Group, LLC	Lead Organization	Industry Small Disadvantaged Business (SDB), Women-Owned Small Business (WOSB)	Ann Arbor, Michigan
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Michigan

Ohio

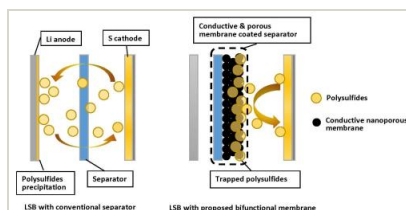
Project Transitions

**June 2017:** Project Start**December 2017:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140783>)

Images



Briefing Chart Image

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(<https://techport.nasa.gov/image/134232>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Navitas Advanced Solutions Group, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

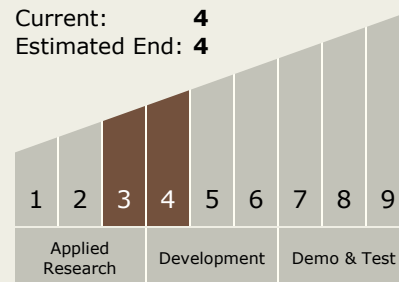
Hong Wang

Technology Maturity (TRL)

Start: **3**

Current: **4**

Estimated End: **4**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.2 Energy Storage
 - └ TX03.2.1 Electrochemical: Batteries